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ABSTRACT

In two experiments, differences were investigated between youths (mean age 13 years) and comparison groups with respect to (1) performance on paired-associate tasks involving meaningful and nonmeaningful words, (2) reported use of spontaneously produced learning strategies, and (3) degree to which learning strategies facilitated recall. Under free-study conditions, gifted youths outperformed their age peers in recall and strategy use, for both meaningful and nonmeaningful word pairs. In both experiments, gifted youths differentially benefited from mediational strategy use. Findings support the notion that gifted youths differ with respect to strategy use from their age peers and that they employ and benefit from strategies more like those used by older subjects. These learning strategies, when produced in sufficient numbers, accounted for a large part of the observed performance differences on verbal learning tasks between gifted Ss and their age peers. (Author/CL)

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Learning Characteristics of Gifted Youths: Precocious Strategy Use

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Running head: STRATEGY USE

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Abstract

In two experiments, differences were investigated between gifted youths and comparison groups with respect to (a) performance on paired-associate tasks involving meaningful and nonmeaningful words, (b) reported use of spontaneously produced learning strategies, and (c) degree to which learning strategies facilitated recall. Under free-study conditions, gifted youths outperformed their age peers in recall and strategy use, for both meaningful and nonmeaningful word pairs. In both experiments, gifted youths differentially benefited from mediational strategy use.

Learning Characteristics of Gifted Youths:
Precocious Strategy Use

The present experiments were concerned with mediational learning strategies spontaneously produced by academically precocious, or "gifted" youths in paired-associate learning. Gifted youths were compared with typical youths in order to determine whether differences exist with respect to overall performance, types of mediational strategies employed spontaneously, and relative efficiency of those strategies.

Mediators in verbal learning, as described here, refer to associations between verbal units produced by the learner. Thus, to learn the word pair "king-table," the learner may posit the mediator "Arthur" between the words to establish a meaningful association between them. Mediators used to form the associations in learning have been of interest to researchers for many years. As early as 1960, Underwood and Schultz found a highly significant performance difference between items for which associations were reported and items for which associations were not reported. These researchers concluded that reports "established beyond doubt that the subjects do make use of existent associations for learning at least some of the items in paired-associate lists" (p. 300).

Other investigators have since demonstrated the presence of such elaborations in verbal learning and the efficiency of these elaborations in promoting learning (Clark, Lansford, & Dallenbach, 1960; Keiss & Montague, 1965; Montague, Adams, & Kiess, 1966; Montague & Kiess, 1968; Rohwer, 1966; Runquist & Farley, 1964). These investigators all agreed that many subjects use spontaneously mediational strategies and that these mediators facilitate performance on paired-associate tasks.

In recent years, researchers have become interested in developmental aspects of mediational strategies in paired-associate learning (Cuvo, 1975; Flavell, Beach, & Chinsky, 1966; Hagen, 1971; Pressley, 1982; Pressley & Levin, 1977; Rohwer, 1973; Rohwer & Bean, 1973). Rohwer (1973) concluded that children tend to abandon rote learning techniques and begin to utilize more effective learning strategies at around the onset of adolescence. Pressley and Levin (1977) in a study with fifth, seventh, and ninth graders, supported Rohwer's hypothesis that a change in types of strategies used occurs during adolescence. Although most fifth grade subjects reported using only rehearsal to learn noun pairs, nearly all older subjects reported using other strategies; very few ninth graders used verbal rehearsal exclusively.

Rohwer and Bean (1973) found that rehearsal instructions did not inhibit learning with elementary age students; however, these same instructions to rehearse did inhibit performance in older

students. It was hypothesized that the older students spontaneously produced more elaborate and efficient learning strategies. In a later three-experiment study, Rohwer, Raines, Eoff, and Wagner (1977) attempted to lend further support to the developmental hypothesis. Although their data generally supported developmental aspects of elaborative strategy use, they also indicated that substantial variance exists within age levels, to such an extent that many twelfth graders were "scarcely distinguishable" from preadolescents. In Experiment 3, Rohwer et al. (1977) examined elaboration propensity within age levels by classifying students by performance on an initial paired-associate task. Higher performing students benefited less from elaboration instructions than lower performing students, suggesting many higher performing senior high school students spontaneously employed elaboration strategies. These researchers concluded that individual differences played a strong role in strategy use. No strong relation was found between elaboration and psychometric intelligence, however. Kennedy and Suzuki (1977) examined the effects of elaboration instruction in average and low IQ students and concluded that average IQ students were less likely to benefit, presumably due to spontaneous use of such strategies.

In a recent review of elaboration literature, Pressley (1982) argued that "researchers in memory development have usually failed to pay attention to within-age differences in strategy usage" (p.

303). Pressley indicated that current data regarding the relation between intelligence and strategy use conflict.

Recently, Scruggs (1982) investigated differences in elaborative strategy use among gifted youths, non-gifted youths, and college undergraduates. He presented low meaningful word pairs at a rapid 3 second rate on an overhead projector in 10 learning and 10 test trials. Gifted youths did not significantly outperform their non-gifted peers with respect to either performance on the task or level of elaborative complexity.

The results of his investigation suggested that gifted youths used learning strategies more similar to those used by their more typical age peers rather than those of college undergraduates. When gifted youths did employ learning strategies, however, their performance was greatly facilitated, unlike that of their age peers. The correlations for college undergraduates and gifted groups resembled those reported by Martin, Boersma, and Cox (1965) in that a statistically significant monotonically increasing trend was found between level of reported strategy complexity and strategy score. This relationship was not seen in the age peer group. Apparently, the gifted youths resembled the college undergraduates in their ability to produce and benefit from complex mediational strategies.

These results supported the prediction that gifted youths would employ learning strategies superior to those of their more

typical age peers, and that they would benefit differentially from the use of these strategies. It was surprising, however, to note such small performance differences among the three groups, considering their age, ability, and achievement differences. Although performance differences were not a primary concern of Scruggs' (1982) investigation, it appears that task variables may have to a certain extent influenced the findings. It has been previously reported that highly structured presentation conditions can inhibit strategy formation and performance on associative learning tasks (Rohwer, Raines, Eoff, & Wagner, 1977), and that spontaneous mediation can be influenced by meaningfulness (Underwood & Schultz, 1960). It was, therefore, felt that the rapid presentation rate and the low meaningfulness of the paralog pairs may have inhibited strategy formation and thereby minimized the differences between the gifted youths and age peers. In the present two experiments, therefore, meaningfulness of word pairs and presentation format were manipulated to examine more closely possible differences in recall and strategy use.

EXPERIMENT 1

Method

Subjects

Twenty-one students enrolled at a university summer program for academically precocious youngsters voluntarily took part in the study. Mean age of the 11 girls and 10 boys was 13 years

10 months (SD = 8 months). Mean SAT (verbal) score was 490 (SD = 75).

Twenty-three typical age peers enrolled in regular education junior high classes in a southwestern metropolitan area voluntarily participated in Experiment 2. None had been previously identified for the school's gifted program. Mean age of the 10 girls and 13 boys was 13 years 6 months (SD = 4 months).

Materials

Fifteen high meaningful word pairs from Noble's (1952) list (e.g., Uncle-Naptha, Effort-Hunger, Argon-Mallet) were randomly assigned positions on an 8 1/2 X 11" (21.6 X 27.9 cm) study sheet. An 8 1/2 X 11" (21.6 X 27.9 cm) response sheet was prepared which included the first item of all pairs followed by a blank space. The pairs were in a different order from that of the study sheet. An 8 1/2 X 11" (21.6 X 27.9 cm) strategy sheet was prepared which included all word pairs presented in the same order as the study sheet. Two blank lines followed each word pair. Instructions were printed at the top of the sheet.

Procedure

Students participated in small groups (eight students or less) in a quiet room. All instructions were read from a prepared script. Students were informed that they would have five minutes

to study a list of word pairs and at the end of that study time, they would be presented the first member of each word pair in a different order and asked to write in the correct response. At the end of the five-minute study time, the study sheet was collected and the response sheet was presented. As students completed the task, their response sheets were collected, strategy sheets were distributed, and students were asked to write down the manner in which they attempted to learn each word pair.

Scoring

A response was scored correct if it contained three or more accurate letters and was easily recognizable as a correct response. One point was awarded for each correct response. Strategies were scored as rote, structural, or semantic. Rote strategies included the following: "memorized," "kept looking at," "repeated," and word pairs for which no answer was given. Structural strategies included the following: "words seemed to rhyme" and "used first letters." Semantic strategies were those for which some meaningful semantic relation was established between the words, for example, "It is an effort for an anorexic to hunger." Coefficient of agreement by two separate scorers unaware of group membership was assessed at .96. Since virtually no structural strategies were reported, these strategies were not separately analyzed.

Results

Gifted youths performed significantly higher than age peers on recall, $t(42) = 3.8$, $p < .001$. Gifted youths learned an average of 72% of the 15 word pairs, while typical age peers learned 44%. In addition, it was found that gifted youths reported using more higher level strategies than their typical age peers. Fifty-two percent of the gifted subjects reported using semantic strategies, while only 17% of the typical age peers reported using semantic strategies. The obtained chi-square was significant for semantic strategies by group ($\chi^2 = 6.37$, $p < .02$).

Gifted youths who reported using semantic strategies outperformed those who did not report strategies, $t(19) = 2.97$, $p < .01$. Gifted youths who reported using semantic strategies recalled an average of 87% of the word pairs, while those not reporting strategies recalled an average of 57%. In contrast, age peers who reported using semantic strategies did not appreciably outperform those who did not report strategies. Since only four typical age peers reported using semantic strategies, significance testing was not done; however, those subjects recalled an average of 47%, while those not reporting strategies recalled an average of 44%.

Pearson product-moment correlation coefficients were computed between number of semantic strategies reported and total recall

score. The correlation for gifted subjects was .49 ($p < .05$) while the correlation for typical age peers was .06 (ns).

Discussion

The findings of Experiment 1 are in contrast with those of Scruggs (1982): under free-study conditions with meaningful word pairs, gifted youths outperformed age peers by 50% on total recall. In addition, nearly three times as many gifted youths as age peers reported using semantic strategies. Gifted youths who did report semantic strategies greatly outperformed gifted students who did not; this finding was not observed in the age peer group. The correlation between reported semantic strategies and total recall was high for the gifted group and near zero for the age peers. It must be noted, however, that since the respective distributions are so different, comparions must be made with caution. The improved performance due to strategy use for gifted youths support the findings of Scruggs (1982). These subjects seemed to benefit from semantic strategies more than their more typical age peers.

In Scruggs (1982) study, typical junior high school students did not differ from gifted youths with respect to strategy use. Furthermore, the performance of the gifted youths was not statistically different from typical age peers. In Experiment 1, however, gifted youths statistically outperformed their more typical age peers in recall and in reported semantic strategy use.

These differences in findings were thought to have resulted from an inhibiting effect from either the rapid presentation rate or the nonmeaningfulness of the paralog pairs used by Scruggs (1982). Experiment 2 was, therefore, designed to replicate the findings of Experiment 1, and to examine more closely the nature of strategy use in gifted youths and their age peers by employing meaningful and nonmeaningful word pairs in a free-study condition.

EXPERIMENT 2

Method

Subjects

Seventeen different gifted subjects enrolled in the same program as Experiment 1 and 2 voluntarily participated in Experiment 3. Mean age of the 9 girls and 8 boys was 13 years 8 months (SD = 9 months). Mean SAT (Verbal) score was 485 (SD = 90).

Seventeen different age peers, who were enrolled in regular education junior high classes in a southwestern metropolitan area voluntarily participated in Experiment 3. Again, none of these subjects had been identified as gifted. Mean age of the 10 girls and 7 boys was 13 years 2 months (SD = 6 months).

Materials and Procedure

Eight word pairs from Experiment 1's low-meaningful list and eight word pairs from Experiment 2's meaningful list were randomly

assigned positions on an 8 1/2 X 11" (21.6 X 27.9 cm) study sheet. An 8 1/2 X 11" (21.6 X 27.9 cm) response sheet was prepared which included the first items of all pairs followed by a blank space. The word pairs were in a different order from that of the study sheet. An 8 1/2 X 11" (21.6 X 27.9 cm) strategy sheet was prepared which included the word pairs presented in the same order as the study sheet. Each pair was followed by two blank lines. The strategy instructions were written at the top of the strategy sheet. All procedures paralleled those used in Experiment 2.

Scoring

Scoring procedures paralleled those of Experiment 2, with the exception that recall and strategy scores were computed separately and overall for meaningful, low-meaningful, and combined word pairs.

Results

Total recall data were entered into a two-group (academically precocious vs. typical age peers) X 2 recall measure (meaningful vs. low-meaningful) ANOVA with repeated measures on the recall variable. Significant effects were found for group $F(1, 32) = 14.86$, $p < .01$, for meaningfulness $F(1, 32) = 17.42$, $p < .01$, and for interaction $F(1, 32) = 17.42$, $p < .01$. The gifted youths recalled 73% of the eight meaningful words and 25% of the eight low-meaningful words, while the age peers recalled 37% of the meaningful words and 7% of the low-meaningful words. The

interaction was discounted, however, due to a probable floor effect in the age peers' performance on the low-meaningful words.

The frequencies of gifted youths and age peers reporting more than two semantic strategies were significantly different, χ^2 = 12.94, $p < .001$, with 65% and 6% reporting such strategies, respectively. For the meaningful words, 71% of the gifted and 6% of the age peers reported using any semantic strategies (χ^2 = 12.57, $p < .001$). For the low-meaningful words, 47% of the gifted youths and 6% of the age peers reported one or more semantic strategies (χ^2 = 7.50, $p < .01$).

Person product-moment correlation coefficients were computed between number of semantic strategies reported and recall score for total correct, for meaningful words, and for low-meaningful words. For the gifted youths, coefficients were: .44 ($p < .02$) for total, .39 ($p < .05$) for meaningful words, and .67 ($p < .01$) for nonmeaningful words. For the age peers, coefficients were: .08 (ns) for total, .11 (ns) for meaningful words, and .04 (ns) for low-meaningful words.

Discussion

The results of Experiment 2 replicate those of Experiment 1, in that gifted students under free study conditions were seen to outperform considerably their age peers. The relative performance differential involving low-meaningful words was discounted due to a probable floor effect. The findings of Experiment 2 also

replicate those of Experiment 1 and those of Scruggs (1982) in that gifted youths were seen to differentially benefit from strategy use, for both meaningful and low-meaningful word pairs.

General Discussion

Gifted youths exhibited superior performance to their more typical age peers on paired-associate tasks involving meaningful and low-meaningful words under a free study condition. In addition, both gifted youths and age peers were seen to exhibit relatively inferior performance on low-meaningful words.

Under free study conditions, more gifted youths reported using semantic strategies than age peers for both meaningful and low-meaningful word pairs. This difference was not found by Scruggs (1982) under rapid presentation conditions. A possible explanation is that the three-second presentation time was not sufficient for junior high school-aged students to produce elaborative strategies for low-meaningful word pairs.

In all experiments, differences were seen between groups in ability to benefit from spontaneously produced strategies. The performance of the gifted youths was apparently facilitated when they used semantic strategies; such an observation was not made with the age peers. These findings support those of Levin, Dretzke, McCormick, Scruggs, McGivern, and Mastropieri (1983) in that average junior high school-aged students were not always seen to benefit from spontaneously produced learning strategies. In

this respect, gifted youths were seen to perform more like the older subjects of Scruggs' (1982) investigation, in that they did appear to benefit from these strategies.

These findings support the notion that gifted youths differ with respect to strategy use from their age peers and that they employ and benefit from strategies more like those used by older subjects. These learning strategies, when produced in sufficient number, were seen to account for a large part of the observed performance differences on verbal learning tasks between gifted youths and their age peers.

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Footnote

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